

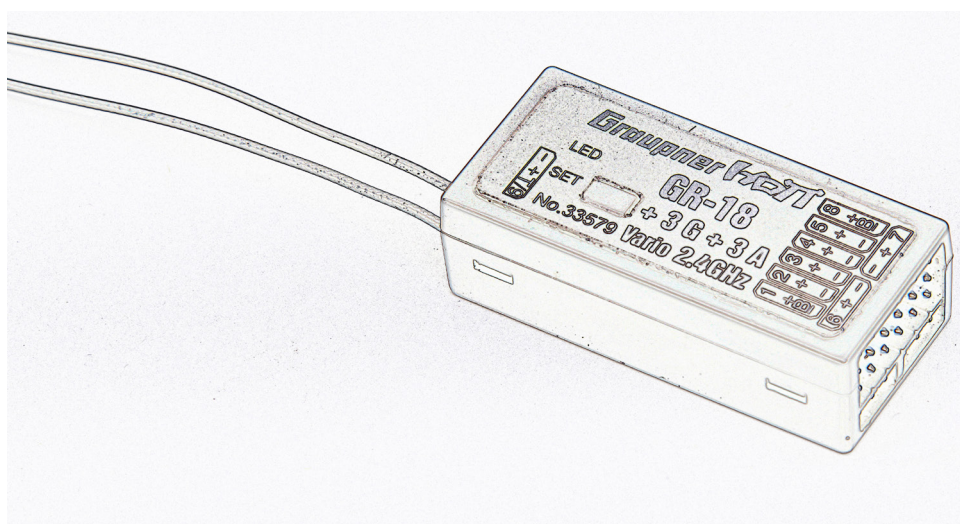
INNOVATION & TECHNOLOGY

Graupner

User manual

HoTT GR-18 receiver with Copterfirmware
No. 33579

English



CE

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Introduction

Thank you very much for choosing a **Graupner** HOTT GYRO RECEIVER. This receiver is extremely versatile.

Read this manual carefully to achieve the best results with your receiver and first of all to control safely your model. If you experience any trouble during operation, take the instructions to help or ask your dealer or **Graupner** Service Centre.

Due to technical changes, the information may be changed in this manual without prior notice. Be always updated by checking periodically for news on our website, www.graupner.de

This product complies with national and European legal requirements.

To maintain this condition and to ensure safe operation, you must read and follow this user manual and the safety notes before using the product!



NOTE

This manual is part of that product. It contains important information concerning operation and handling. Keep these instructions for future reference! Take this into consideration when you pass it on to other future owner.

Service centre

Graupner/SJ-Zentralservice

Graupner/SJ GmbH
Henriettenstrasse 96
D-73230 Kirchheim / Teck

Servicehotline

 (+49) (0)7021/722-130
Mon - Thu
7:30 am - 9:00 am
9:15 am - 4:00 pm
Fri
9:00 am - 1:00 pm

Graupner in Internet

For the service centres outside Germany please refer to our web site **www.graupner.de**

Package content

- › HoTT Gyro receiver
- › User manual

Intended use

The receiver is only suitable for use with RC multicopter models. More punctual information about receiver can be found in the Technical data section.

The receiver is designed exclusively to be used as a battery-powered, radio controlled model, any other use is not allowed. For any improper use no warranty or liability is accepted. Read through this entire manual before you attempt to program or set the receiver.

Graupner/SJ constantly works on the development of all products; we reserve the right to change the item, its technology and equipment.

Target group

The receiver is not a toy. It is not suitable for children under 14 years. The installation and operation of the controller must be performed by experienced modellers. If you do not have sufficient knowledge about dealing with radio-controlled models, please contact an experienced modeller or a model club.

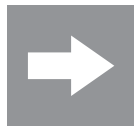
Features

- The Firmware is a specific Multicopter firmware. The model type Surface/Heli are not available. The firmware for Surface/Heli models can however be used. Only one firmware can be used per time.
- The receiver provides copter stabilization on 3 axes
- Natural flight performance
- Very good stabilization for aerobatic figures
- Easy adjusting of the gyro settings
- Parameters setting by the HoTT Telemetry
- Altitude sensor for vario and altitude

Technical Data

- Operating temperature: - 15...+70 °C
- Antennas: 2 x wires 145 mm
- Total weight approx.: 14 g
- Frequency: 2400 ... 2483.5 MHz
- Range approx.: 4000 m
- Dimensions ca.: 46 x 21 x 14 mm
- Modulation: 2.4 GHz FHSS
- Current consumption: 70 mA
- Operating voltage: (2,5) 3,6 ... 8,4 V

Symbols explication



Always follow the information marked with the **CAUTION** or **WARNING** symbol. The signal word **WARNING** indicates the potential for serious injury, the signal word **CAUTION** indicates potential minor injuries.

The **NOTE** indicates important information that should alert you to potential property damage.

Safety notes

WARNING



- These safety instructions are intended not only to protect the product, but also for your own and other people's safety. Therefore please read this section very carefully before using the product!
- Do not leave the packaging material lying around, this could be a dangerous toy for children.
- Persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, or not capable to use safely the receiver, must not use it without supervision or instruction by a responsible person.
- The operation of radio controlled models must be learned! If you have never driven such a model, then start extra carefully and make sure to be familiar with the reactions of the model to the remote control commands. Proceed responsibly.
- Always carry on a first range test and function test on the ground (hold the model tightly) before your model is used. Repeat the test with the motor running and with short bursts of throttle.
- Before you start using the remote control model, you have to check the further relevant laws and regulations. These laws you must obey in every case. Pay attention to the possibly different laws of the countries.
- The insurance is mandatory for all kinds of model operation. If you already have one check out whether the operation of the model is covered. If applicable, extend it to special model liability insurance. We recommend to provide the copter with a label, where are indicated the name, address, tel. n., E-mail and Insurance n. So that the copter can be clearly assigned in the event of a crash.
- For safety and (CE) certification the unauthorized conversion and / or modification of the product is not permitted.
- They may only be used our recommended components and accessories. Use only genuine matching **Graupner** connectors of the same design and the same material.
- Make sure that all connections are secure. Do not pull on the cables when you unplug the connector.

- › Protect the receiver from dust, dirt, moisture and other foreign parts. Do not expose this equipment to vibration and excessive heat or cold. The remote control operation may be carried out only in “normal” ambient temperatures, in a range from -10 ° C to +55 ° C.
- › Use all of your Hott components only with the latest Software version
- › If any questions arise that can not be ascertained with the help of the operating manual, please contact us (contact information, see page 3) or another expert.



WARNING

Pay attention, even while programming, that the connected motors do not start suddenly. Injury risk by the turning propellers!

Avoid shock and pressure. Check the receiver regularly for damages to the housings and cables after every flight. Damaged or wet electronic components, even if re-dried, should no longer be used.



Installation in the model (Copter)

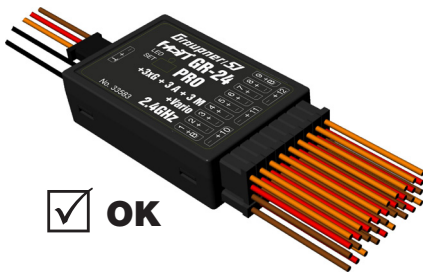
The receiver must be placed in line with one side of the Copter, secure it to the receiver holder. The lower surface of the receiver must always be parallel to one of the copter sides. Put some double-sided tape on the bottom of the receiver and use the optimal double taped pads S8376 for Gr-18, S8377 for Gr-24 PRO.

Binding

The binding is only possible if the receiver has not yet been binded to another transmitter (red LED blinks). Pushing the SET button the receiver will be set in Bind mode.

If you want to bind an already binded receiver to another memory, follow the next steps:

- › Turn off the RF module in the “Basic setting” menu (see transmitter’s manual)
- › Switch on the receiver pushing the SET button to bring it in bind mode
- › Start the binding in the “Basic setting” menu
- › If within 10 seconds the red light turns off and the green LED will light, the binding process was successful.
- › Your RC system is now ready for use.
- › If the red LED is still on it means that the binding process didn’t work properly. In this case repeat the procedure.



Connections

Connect the speed controllers or Servos to the row of sockets on one end of the receiver. The connectors are polarised: note the small

chamfers on one side. Never use force - the connectors should engage easily. The polarity is also printed on the receiver; the negative wire (-) is brown, the positive (+) red and the signal orange. The servo sockets of **Graupner HoTT** 2.4 receivers are numbered sequentially. The socket for channel 8 (K6 in GR 18) can also be programmed to deliver a (digital) sum signal (see next section).

Power supply

The receiver does not feature specific sockets for connecting the battery. We recommend that you connect the power supply to the socket(s) close to the servos already connected to the receiver. If you wish to connect multiple separate batteries, the batteries must be of the same nominal voltage and capacity. Never connect batteries of different type, or packs of greatly differing states of charge, as this can cause effects similar to a short-circuit. If you encounter this problem, we recommend the use of a voltage stabiliser unit (e.g. PRX-5A receiver power supply, Order No. 4136) between the batteries and the receiver.

Telemetry or channel (T/9) socket

The optional telemetry sensors are connected to the socket marked "T" (T/9)- Telemetry. In addition, the update is performed on this socket (see point 5). The socket can be used optionally for K9. (see next section)

```
RECEIVER    0.01 >
>ALARM VOLT: 3,8V
ALARM TEMP: 70°C
max altitude: 25m
PERIOD:     20ms
SUMD at CH6: No
Sensor at CH9: No
LANGUAGE:   english
```

Receiver setting menu

The receiver set-up menu appears in the "Telemetry" menu under SETTINGS / DISPLAYS; alternatively - if you are using a SMART-BOX - under SETTING & DATAVIEW. The method of accessing this menu is described in the operating instructions supplied with your transmitter or the Smart-Box.

Low-voltage warning (ALARM VOLT)

If the receiver voltage falls below the set value, a low-voltage warning is generated by the transmitter's RF module in the form of the "general alarm tone": a regular beeping at a rate of about one per second; alternatively the speech output message "Receiver voltage".

Temperature warning (ALARM TEMP)

If the receiver temperature exceeds the set temperature threshold, a warning is generated by the transmitter's RF module in the form of the "general alarm tone": a regular beeping at a rate of about one per second; alternatively the speech output message "Receiver temperature".

Setting important only if servos are installed for particular functions

Maximum altitude (Max. altitude)

At this point you can enter a maximum altitude, at which an alarm is triggered, either via the transmitter's RF module in the form of the "general alarm tone": a regular beeping at a rate of about one per second; alternatively the speech output message "Height". Note: the model's actual height is adopted as zero when the receiver is switched on; the indicated height is therefore the altitude relative to the launch point.

Cycle time (PERIOD)

If your system is used exclusively with digital servos, you can set a cycle time (frame rate) of 10 ms at this point. If your system includes some or all analogue servos, you should always select 20 ms, as many analogue servos cannot process the higher frame rate, and may respond by "jittering" or "growling". Not important for connected speed controllers.

HoTT sum signal (SUMD)

If you activate the digital sum signal at channel 8, a sum signal containing eight channels is present at this socket, instead of a servo signal. The HoTT receiver configured as SUMD constantly generates a digital sum signal from 8 control signals from the transmitter and makes this signal available at the appropriate servo socket, which is receiver-specific. At the time these instructions were revised, this type of signal is used by several of the latest electronic developments in the area of flybarless systems, heavy-duty airborne power supplies, etc.

Telemetry sensor (sensor at CH9)

This socket allows you to use either for telemetry or for an extra channel (9). (Note: Both together is not possible!) Switching is done in this menu item.

- If you select "Yes", the socket is connected to the connection of a sensor.
- If you select "No" a jack is connected to the control channel 9.

Gyro initialization

After switching on the Copter, the gyro is already active but not yet initialized. To initialize it, hold the Copter still after switching on. The calibration will be done only when the receiver is completely still.

After 3 seconds in still position you will hear beeps emitted by all motors. The signal tone can vary depending on the esc model. The beeps will stop when the calibration and initialization is complete. Wait until the initialization is complete before you start the model! The motors will not start until the calibration is complete.

Initialization by switching on

Step 1:

Setting the flight mode - Attitude or Rate mode

Transmitter pre-setting

In the transmitter it must be selected a free model memory, the model type must be "surface model" and the channel 1 direction must be set so that in "motor off" position the power indicator must show -100%.

The flight mode must be set on channel 5. Then program a two-way switch for channel 5 to control the flight mode:

Attitude mode: Channel 5 = -100% to 0%. The stick movement determinates the Copter reaction on Roll and Nick. It allows a maximal angle of about 50° at 100% of stick movement. Mode suggested for beginners. The stick movements acts directly proportionally to Roll and Nick.

Rate mode: Channel 5 = 0% to +100%. The stick movement determinates the rate without angle limit. Aerobatic mode that allows Rolls and Loopings.

Step 2:

Main settings

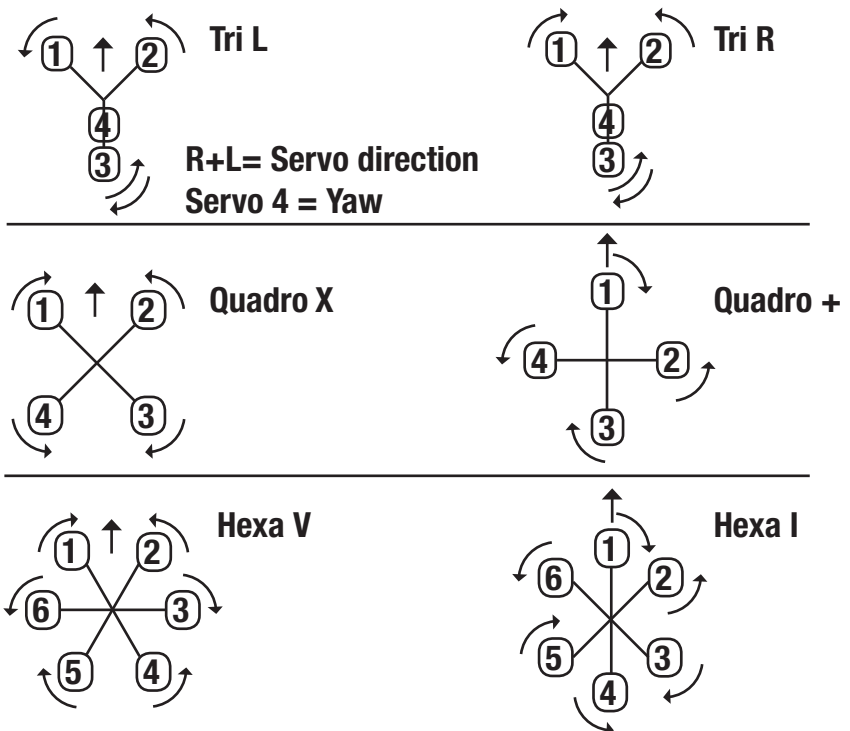
```
MULTICOPTER BASE < >
>TYPE          QUADRO X
MODE           NORMAL
MINPOWER %     10
LOGGING        1
CALIBR. POSITION NO
```

Main settings

Type

Quadro x, Quadro +, Hexa I, Hexa V, Tri L, Tri R

Channel connections to the receiver for the different copter types, motor and speed controller connection seen from the top. In case of tricopter use only digital servos for servo 4.

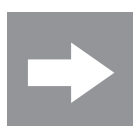


Mode

ESC settings for the learning of the controller the receiver K1 signal will be passed directly to the controller.

Normal is set for 'normal' multicopter (without clockwise rotation).

Note: For safety reason the **Type** and **Mode** changes take effect after switching off and on (only for this parameter). Which con-



sequence this parameter has to gas curve, will be explained in next section.

MINPOWER %

The setting is principally used to prevent the motors shut down in flight. Adjust so that the motors are running straight. Under no circumstances unnecessarily high set, this would limit the controller possibilities. These are some internal channel 1 curves:

Mode = **normal**: (Attitude+Rate) <-95%: Motors off, from about minimum gas linear increase

Note: When in use with mode = **normal** we suggest, to program a switch in the transmitter, which can set channel 1 at least at -95%, so that while fling you cannot stop completely the motors.



LOGGING

Value 1 is the general attitude control, rest as needed logs the corresponding servo to SD card for later evaluation and error analysis.

Settable values:

0 = No logging, Telemetry display of Euler and yaw angle

1 = Roll and Nick logging

We suggest to set at least one function.

CALIBR. POSITION

With **Calibr. Position** the acceleration sensors can be calibrated so that in attitude mode with stick and trim neutral, the copter is precisely horizontally aligned. For this purpose, it is simply placed on absolute level surface and set the value to Yes. After a moment, it jumps back to No and the calibration is done. Do not forget to store disabling the field!

Step 3

Axis assignment in the gyro

Axis assignment		<
>Setup	No	
ROLL	+0	
NICK	+0	
YAW	+0	

Axis assignment

Setup: Setup: Yes/No

Assignment of the gyros and their operating direction.

In the receiver's "Axis assign" menu, go to the "Setup" option and set it to "Setup: Yes". Now assign the axes as follow:

- On the transmitter, briefly set the roll command fully to the right; the roll axis is highlighted. Roll the Copter more than 45 degrees to the right → the identified axis with the required prefix is displayed, the field is no longer highlighted and identification of this axis is complete.
- Now do the same for nick: on the transmitter, briefly set the nick command so that it is fully forward. Roll the Copter more than 45 degrees forwards; the axis is displayed, the field is no longer highlighted and identification of this axis is complete.
- Finally complete the procedure for the yaw: on the

transmitter, briefly set the yaw command fully to the right. Turn the Copter so that the nose turns more than 45 degrees to the right; the axis is displayed, the field is no longer highlighted and identification of this axis is complete. The gyros and operating directions have now been assigned.

Now check to make sure that the operating directions are correct:

- › To do this remove the propeller of the copters and give approximately a quarter of gas, all motors are running at the same speed
- › Tilt the Copter in Attitude mode so that its nose is facing downwards → the front motors must turn faster than back ones
- › Tilt the Copter in Attitude mode to one side → the motors of the side, in witch you tilt the model, must turn faster then the motors on the other side.
- › If one of the directions of operation is wrong, you must repeat the axis assignment process.

Step 4:

Optional setting for Roll and Nick

Multicopter RO/NIC >		
>ROLL/NICK P		50
ROLL/NICK D		30
ROLL FACTOR %		65
POWER2SENS.		80
--ATTITUDE MODE--		
ROLL/NICK I		40
AGILITY		3

Multicopter RO/NIC >		
--RATE MODE--		
R/N RATE I		25
RATE		3

Roll and Nick setting

For Attitude and Rate mode:

ROLL/NICK P:

Set this parameter in steps of 5 higher and higher, until a medium-speed overshoot occurs. Then go 5-10 steps back in order to prevent the soar up climb in case of full throttle.

ROLL/NICK D:

Now adjust well to the D component in steps of 5, until the Copter engages exactly on nick and roll. A too high value leads to very rapid oscillations.

ROLL FACTOR %:

Set the Roll setting as percent value of the overall gain. For symmetric Copters the value can be 100. If, because of its gravity centre, the Copter is more agile on the Roll axis than on the Nick axis, then you can change here the roll factor. In the **Graupner ALPHA RACE 250 Q** this value is set about 65%.

POWER2SENS.:

Very strong drives can lead to oscillating at full throttle. This parameter allows you to set a kind of gyro suppression. Higher values result in an increased gyro suppression towards full throttle.

Only for attitude mode:

ROLL/NICK I:

Set the I component of the Attitude mode. At too low values the Copter swings slowly. If it stops after a roll or pitch command and "oscillates", the value must be reduced.

AGILITY:

Agility determines at what speed (yaw rate) a new position is occupied.

Only for Rate mode:

R/N RATE I:

Sets the I component of the rotation in rate mode. At too low values of Copter swings slowly. However, it stops after a roll or pitch command and “oscillates”, the value must be reduced.

RATE: Sets the max. potential rate of rotation in Rate mode.

Step 5:

Optional settings for Yaw

```

Multicopter Yaw(v)
>Yaw P      40
Yaw I       20
Yaw D       20
    
```

Multicopter Yaw settings

Yaw P - Factor

Standard setting: +45

The P factor is responsible for the harder snap to yaw. Higher values result in a faster engagement.

At too high P-values the copter starts to “swing”. In this case, the value must be reduced again.

Yaw I - Factor

Standard setting: +15

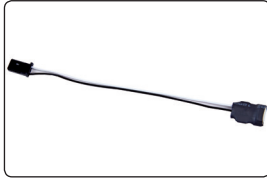
The I-factor ensures constant rotations. Start with low values and increase only as long until the rotations are constant. Too high value cause an oscillation when you stop and possibly the motors can run higher. This can lead to an undesirable rise.

Yaw D - Factor

Standard setting: MIN

The D-factor affects the stopping behaviour in yaw. In most Copters a hard D action is necessary. The D component must be set as low as possible, since it affects the whole system.

Firmware Update



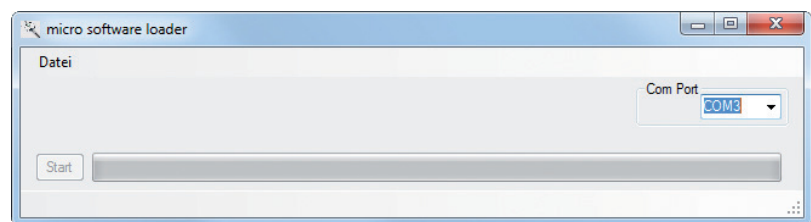
Updates to the receiver's firmware are made via the telemetry socket using a PC running Windows XP, Vista or 7. You will also need a USB interface (order no. 7168.6) and adapter lead (order no. 7168.6A or 7168.S), which are available separately. The programs and files required can be found in the Download area for the corresponding products at **www.graupner.de**. Connect the adapter lead to the USB interface (order no. 7168.6). The connectors are reverse polarity protected: note the small chamfers on the sides. Never use force – the connectors should engage easily.

Connect the adapter lead to the receiver's telemetry socket. The connectors are reverse polarity protected: note the small chamfers on the sides. Never use force – the connectors should engage easily.

Starting the "Slowflyer/Gyro receiver update"

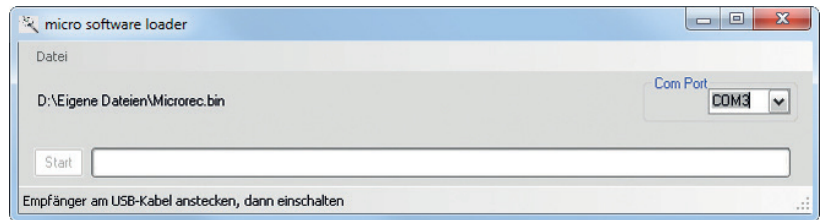
We recommend accessing the "Slowflyer/Gyro receiver downloader" program from the "Firmware_Up-grade_grStudio" program. Click on the "Receiver Downloader" item under "Link" in the left function menu. (Alternatively, select the "Micro Receiver Upgrade" under "Menu").

It is also possible to start the associated application program directly by double-clicking on the "micro_gyro_swloader.exe" file. You will find this .exe file in the "Graupner_PC Software" folder of the "HoTT_Software VX" package. A program window will now appear in which you should first set the "correct" COM port for the USB interface (order no. 7168.6) in the selection window.

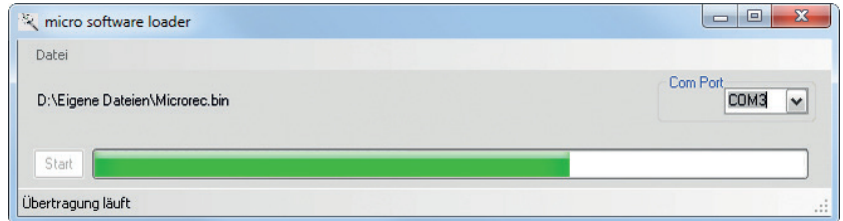


If you are not sure which port to use, check the COM port in the "Select Port" window in the "Menu" of the "Firmware_Up-grade_grStudio" and note down the COM port number for the "Silicon Labs CP210x USB to UART Bridge" entry – in this case "COM03". (If you select the wrong port, you will be alerted to this when you read out the receiver data). Click on "File" to load the corresponding firmware file named "MicroStabi7X-_V_XX.bin" from the hard disc ("XX" stands for the version number).

When the file has loaded, click on start...



... connect the receiver and switch it on.



The progress bar shows that the transfer is running normally. The receiver LED lights up red and green during this process and flashes red and green alternately once the transfer is complete. Please refer to the detailed update instructions for the item in question in the Download area at **www.graupner.de**.

Declaration of conformity

Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)

Declaration of Conformity in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/EG (R&TTE)

Graupner/SJ GmbH
Henriettenstraße 96
D-73230 Kirchheim/Teck

erklärt, dass das Produkt:
declares that the product

GR-24 PRO +3xG + 3A + 3M+Vario HoTT - No. 33583
GR-18 +3xG + 3A+Vario HoTT - No. 33579

Gerätekategorie:
Equipment class

1

den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of § 3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive).

Angewendete harmonisierte Normen:
Harmonised standards applied

EN 60950-1:2006+A11: Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1)a))
2009+A1:2010+A12: Health and safety requirements pursuant to § 3 (1) 1. (Article 3 (1) a))
2011

EN 301 489-1 V1.9.2 Schutzanforderungen in Bezug auf elektromagnetische
EN 301 489-17 V2.1.1 Verträglichkeit § 3 (1) 2, Artikel 3 (1) b))
Protection requirement concerning electromagnetic compatibility
§ 3 (1) 2, Artikel 3 (1) b))

EN 300 328 V1.8.1 Maßnahmen zur effizienten Nutzung des Frequenzspektrums
§ 3 (2) (Artikel 3 (2))
Measures for the efficient use of the radio frequency spectrum
§ 3 (2) (Article 3 (2))



Kirchheim, 17. April 2013

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#33579: GR-18+3xG+3A+Vario
FCC ID: SNL-16006100
#33583: GR-24 PRO +3xG+3A+3M+VARIO
FCC ID: SNL-16005800



Notes for environmental protection

DISPOSAL NOTES

The symbol on this product, its operating instructions or packaging gives notice that this product may not be discarded as common household waste at the end of its service life. It must be turned over to a recycling collection point for electric and electronic apparatus.

The materials can be recycled according to their markings. You make an important contribution to protection of the environment by utilizing facilities for reuse, material recycling or other means of exploiting obsolete equipment.

Batteries must be removed from the unit and disposed of separately at an appropriate collection point. Please inquire with local authorities about the responsible waste collection locations.

Warranty

Graupner/SJ GmbH, Henriettenstrasse 96, 73230 Kirchheim/Teck, Germany guarantees this product for a period of 24 months from date of purchase. The guarantee applies only to such material or operational defects which are present at the time of purchase of the product. Damage due to wear, overloading, incompetent handling or the use of incorrect accessories is not covered by the warranty. The user's legal rights and claims under guarantee are not affected by this guarantee. Please check the product carefully for defects before you make a claim or send the item to us, since we are obliged to make a charge for our cost if the product is found to be free of faults.

The present construction or user manual is for informational purposes only and may be changed without prior notice. The current version can be found on the Internet at www.graupner.de on the relevant product page. In addition, the company Graupner/SJ GmbH has no responsibility or liability for any errors or inaccuracies that may appear in construction or operation manuals.

No liability can be accepted for printing errors.